

There has thus been described a method and apparatus of differential coding for use in bursty transmission networks which greatly improves the quality of transmitted compressed information. Although the present invention has been described in terms of preferred embodiments, it will be appreciated that various modifications and alterations might be made by those skilled in the art without departing from the spirit and scope of the invention. The invention should, therefore, be measured in terms of the claims which follow.

What is claimed is:

1. For use in a communications network having a plurality of nodes wherein a node may encode real-time information for propagating over said network, a method of processing said real-time information comprising the steps of:
 - providing said node with a plurality of output buffers;
 - (a) electronically capturing said real-time information and converting it into electronic data;
 - (b) differentially encoding said electronic data using a previously stored transmit reference image as a base to produce differential data;
 - (c) storing said differential data in one of said plurality of output buffers;
 - (d) monitoring said network for access to propagate said differential data;
 - repeating steps (a)-(d) until said node may propagate said differential data over said network;
 - transmitting data over said network from the one of said plurality of output buffers providing a best differential data to a receiving node on said network, wherein said best differential data represents a differential data whose use in conjunction with the previously stored transmit reference image produces an image that approximates a current frame better than use of other differential data contained in said plurality of output buffers; and
 - calculating a new transmit reference image based on said best differential data and said previously stored transmit reference image.

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SUBA1

1 2. An apparatus comprising:
2 an encoder for producing encoded real-time information;
3 a transmit reference buffer for storing a current transmit reference;
4 compression circuitry coupled to the encoder and to the transmit reference buffer for
5 producing compressed data based upon the current transmit reference and
6 the encoded real-time information;
7 a plurality of output buffers coupled to the compression circuitry for storing the
8 compressed data; and ✓
9 a network interface coupled to the plurality of output buffers, the network interface
10 for interfacing with a network, for determining a selected output buffer from
11 the plurality of output buffers and for transmitting data over the network
12 from the selected output buffer, the selected output buffer containing
13 compressed data which accommodates one or more characteristics of the
14 network better than at least compressed data in another buffer of the
15 plurality of output buffers.

1 3. The apparatus of claim 2, wherein the selected output buffer contains compressed
2 data which accommodates one or more characteristics of the network better than
3 compressed data in all other buffers of the plurality of output buffers.

SUBA2

1 4. An apparatus for transmitting real-time information over a network, the apparatus
2 comprising:
3 an encoder for producing encoded real-time information; ✓
4 a transmit reference buffer for storing a current transmit reference;
5 compression circuitry coupled to the encoder and to the transmit reference buffer for
6 producing compressed data based upon the current transmit reference and
7 the encoded real-time information; and

a plurality of output buffers coupled to the compression circuitry for buffering the compressed data, each of the plurality of output buffers having a contents, the contents of a selected output buffer of the plurality of output buffers to be transmitted onto a data communications channel of a network based upon one or more characteristics of the data communications channel.

5. The apparatus of claim 4 further comprising a network interface coupled to the plurality of output buffers, the network interface for interfacing with the network, the network interface determining the selected output buffer and transmitting data over the network from the selected output buffer.

6. The apparatus of claim 5, wherein the selected output buffer contains compressed data which, when used in conjunction with the current transmit reference, accommodates the one or more characteristics of the data communications channel better than compressed data from at least another buffer of the plurality of output buffers.

7. The apparatus of claim 5, wherein the selected output buffer contains compressed data which, when used in conjunction with the current transmit reference, accommodates the one or more characteristics of the data communications channel better than compressed data from all other buffers of the plurality of output buffers.

8. The apparatus of claim 4, wherein the compressed data comprises a differential between the encoded real-time information and the current transmit reference.

9. The apparatus of claim 4, wherein the one or more characteristics of the data communications channel include bandwidth availability on the data communications channel.

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4 compression circuitry coupled to the encoder and to the transmit reference buffer for
5 producing compressed data based upon the current transmit reference and
6 the encoded real-time information;
7 a plurality of output buffers coupled to the compression circuitry for storing the
8 compressed data; and
9 a network interface coupled to the plurality of output buffers, the network interface
10 for selecting a selected output buffer of the plurality of output buffers by
11 determining, with reference to one or more predetermined coding strategies,
12 whether compressed data from the selected output buffer is appropriate for ✓
13 transmission to a receiving node.

1 16. The apparatus of claim 15, wherein the one or more predetermined coding strategies
2 include minimizing artifacts.

1 17. The apparatus of claim 15, wherein the one or more predetermined coding strategies
2 include allocating available bandwidth to achieve a higher frame rate.

1 18. An apparatus comprising:
2 an encoder for producing encoded real-time information;
3 compression circuitry coupled to the encoder for producing compressed data based
4 upon a previously stored transmit reference and the encoded real-time
5 information;
6 a plurality of output buffers coupled to the compression circuitry for storing the J
7 compressed data; and
8 a network interface coupled to the plurality of output buffers, the network interface
9 transmitting compressed data from a selected output buffer of the plurality
10 of output buffers, the compressed data from the selected output buffer when
11 used in conjunction with the previously stored transmit reference
12 approximating a next frame expected by a receiving apparatus.

1 19. A method of transmitting data over a network comprising the steps of:
2 encoding the data by determining the differences between the data and a transmit
3 reference to produce differential data;
4 storing the differential data in one of a plurality of output buffers;
5 selecting one of the plurality of output buffers as a current transmit buffer based
6 upon one or more characteristics of a data communications channel of a ✓
7 network; and
8 transmitting differential data from the current transmit buffer over the network.

SUBA3

1 20. A method of transmitting real-time data over a network comprising the steps of:
2 encoding the real-time data by determining the differences between the real-time
3 data and a transmit reference to produce differential data;
4 storing the differential data in one of a plurality of output buffers;
5 selecting one of the plurality of output buffers as a current transmit buffer by ✓
6 determining whether the differential data in a particular transmit buffer
7 accommodates the one or more characteristics of the network better than
8 differential data in at least another buffer of the plurality of output buffers;
9 and
10 transmitting differential data from the current transmit buffer over the network.

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